

CLAIMS

1. A method for assisting development of a program for a vehicle, comprising:

5 a program generation step of generating a vehicle control program using a program generator having a function for generating a segment of vehicle-use code based on a control specification input;

10 a downloading step of downloading the generated vehicle control program to a vehicle ECU; and

a debug step of debugging the vehicle control program by causing the vehicle ECU to execute the vehicle control program.

2. A method for assisting development of a program for a vehicle according to claim 1, wherein

15 debugging at the debug step is carried out in the program generator which inspects a result of execution of the vehicle control program by the vehicle ECU.

20 3. A method for assisting development of a program for a vehicle according to claim 2, further comprising:

a control execution step of connecting the vehicle ECU to a vehicle model device which models a vehicle to be controlled, to cause the vehicle ECU to control the vehicle model device;

and

an inspecting step of inspecting the vehicle ECU and the vehicle model device while control is applied.

5 4. A method for assisting development of a program for a vehicle according to claim 3, further comprising:

 a model generation step of generating a vehicle model in the program generator based on a vehicle specification input; and

10 a model download step of downloading the vehicle model generated at the model generation step to the vehicle model device.

5. A method for assisting development of a program for a vehicle according to any one of claims 1 to 4, wherein the segment 15 of vehicle-use code is a segment of general code modified to suit an integer logic to be processed in the vehicle ECU.

6. A method for assisting development of a program for a vehicle according to claim 5, wherein a vehicle control program 20 is generated at the program generation step, so as to accord to an integer conversion condition input into the program generator.

7. A device for assisting development of a program for a vehicle, comprising:

input means for inputting a vehicle control specification;

5 program generation means for generating a segment of vehicle-use code for a vehicle control program based on the control specification;

download means for downloading the vehicle control program to an external vehicle ECU; and

10 output means for outputting a result of execution of the vehicle control program by the vehicle ECU.

8. A device for assisting development of a program for a vehicle, comprising:

15 a chart generation function for generating a data flowchart and a state flowchart indicative of a vehicle control specification; and

a program code generation function for generating, based on the charts generated, a segment of vehicle-use code for a 20 vehicle control program having an integer logic to be processed by a vehicle ECU.

9. A device for assisting development of a program for a vehicle according to claim 8, further comprising:

a simulation function for simulating the data flowchart with application of a floating point number corresponding to a physical value and of an integer obtained by converting a floating point number, to output results of simulations with 5 floating point number applied thereto and of the integer applied thereto, respectively.

10. A device for assisting development of a program for a vehicle according to claim 9, wherein a result of back 10 calculation to obtain a floating point number from a result of simulation with an integer applied thereto is displayed so that a difference between results of simulations with the floating point number applied thereto and of the integer applied thereto, respectively, can be determined.

15

11. A device for assisting development of a program for a vehicle according to claim 10, wherein the data flowchart has a block symbol which includes information concerning a floating point number, an integer, an integer conversion condition from 20 a floating point number to an integer, and a result of back calculation to obtain an integer from a floating point number using the integer conversion condition.

12. A device for assisting development of a program for a

vehicle according to claim 11, wherein the integer conversion condition is able to be adjusted based on a result of the simulation.

5 13. A device for assisting development of a program for a vehicle according to any one of claims 8 to 12, further comprising

a priority function for defining an order for executing a plurality of data flowcharts in a same hierarchy in the same flowchart.

10 14. A device for assisting development of a program for a vehicle according to any one of claims 8 to 13, further comprising

15 a labeling function for assigning a desired label to a symbol connection line desirably selected in the data flowchart,

wherein

20 a vehicle-use code using the label as a variable name of a part with the label attached is generated.

15. A device for assisting development of a program for a vehicle according to any one of claims 8 to 14, further comprising

a grouping function for grouping a plurality of processes corresponding to a plurality of block symbols in the data flowchart when the vehicle-use code is generated.

5 16. A device for assisting development of a program for a vehicle according to claim 15, wherein grouping is applied according to a predetermined grouping restriction condition which defines a number of block symbols to be grouped.

10 17. A device for assisting development of a program for a vehicle according to claim 15 or 16, further comprising a labeling function for assigning a desired label to a symbol connection line desirably selected in the data flowchart,

15 wherein
a part with the label attached thereto is set as a grouping segment.

18. A device for assisting development of a program for a vehicle according to any one of claims 8 to 17, wherein a segment of vehicle-use C code is generated by modifying, using the program code generation function, a segment of general C code to suit a vehicle ECU.

19. A computer readable memory medium for use in assisting development of a program for a vehicle, bearing a program causing a computer to execute

a chart generation function for generating a data

5 flowchart and a state flowchart indicative of a vehicle control specification, and

a program code generation function for generating, based on the generated chart, a segment of vehicle-use code for a vehicle control program having an integer logic to be processed

10 by a vehicle ECU.

2025 RELEASE UNDER E.O. 14176